

What is claimed is:

1. A dynamic brace comprising:
  - an upper and a lower brace arm;
  - at least one strap securing said brace arms to a leg;
  - a central joint pivotally connecting said brace arms to allow said brace arms to pivot from a flexed to an extended position;
  - a medial/lateral joint in each brace arm proximate to said central joint;
  - two cams disposed between said medial/lateral joints, each said cam having first and second ends, an arcuate cam surface at said first end proximate to one of said medial/lateral joints, and a contact surface at said second end;
  - said cams positioned so there is a distance between said cam surface and said medial/lateral joint;
  - a stop block proximate to said medial/lateral joint in each brace arm and opposite from said arcuate cam surface, said stop block adapted to contact and slide along a segment of said cam surface, as said brace arms pivot from said flexed to said extended position;
  - wherein each said cam surface is shaped such that as said stop block slides along said segment of said cam surface, said brace arm is dynamically inclined an amount toward said leg;
  - wherein the length of said segment determines said amount said brace arms are dynamically inclined;
  - an adjustment wheel disposed between said contact surfaces of said cams, said wheel adapted to equally adjust said distance of said cams from said medial/lateral joints;

wherein said stop blocks slides along a longer segment of said cam surfaces when said cams are closer to said medial/lateral joints.

2. The brace of claim 1 further comprising a wheel in said stop block, wherein said stop block slides along said segment of said arcuate cam surface by said wheel rolling along said segment.

3. The brace of claim 1 wherein said central joint is a geared polycentric joint.

4. The brace of claim 1 wherein each said cam further comprise at least one slot axially aligned between said first and second ends of said cams and wherein pins seat in said slots to allow said distance between said cam surface and said medial/lateral joint to be adjusted.

5. The brace of claim 1 wherein said stop block does not contact said cam surface when said brace arms are in said flexed position.

6. A brace of claim 1 wherein said adjustment wheel comprises a central aperture and two surfaces, each surface contacting said contact surface on one of said cams, wherein said surfaces on said adjustment wheel have an arcuate shape such that, as said adjustment wheel is rotated in a first direction said cams are both equally pushed radially outward toward said medial/lateral joints, and as said adjustment wheel is rotated in a second direction said cams are both equally allowed to move radially inward away from said medial/lateral joints;

7. The brace of claim 6 further comprising:

a knob, located in a housing and adapted to rotate said adjustment wheel;

an indicator on said knob adapted to line up with index markings on said housing;

a circumference in said housing around said knob, said circumference containing regularly spaced detents;

at least one resiliently deformable finger protruding from said knob and adapted to seat in any of said plurality of detents.

8. The brace of claim 1 further comprising a shell secured to each brace arm and extending partially around the leg.

9. The brace of claim 8 wherein said shells are integral with said brace arms

10. The brace of claim 1 further comprising at least one pad secured to said brace adapted to contact said leg.

11. The brace of claim 1 further comprising a spring spanning each medial/lateral joint biasing said brace arms to a non-inclined position.

12. A dynamic brace comprising:

- an upper and a lower brace arm;
- at least one strap securing each said brace arm to upper and lower portions of a leg;
- a central joint pivotally connecting said brace arms to allow said brace arms to pivot from a flexed to an extended position;
- a medial/lateral joint in each brace arm proximate to said central joint;
- two cams disposed between said medial/lateral joints, each said cam having first and second ends, an arcuate cam surface at said first end proximate to one of said medial/lateral joints, and a contact surface at said second end;
- said cams positioned so there is a distance between said cam surface and said medial/lateral joint;
- a stop block proximate to said medial/lateral joint in each said brace arm, opposite from said cam surface;
- a wheel pivotally connected in said stop block adapted to roll along a segment of said cam surface as said brace arms pivot from said flexed to said extended position;
- wherein each said cam surface is shaped such that as said wheel rolls along said segment of said cam surface, said brace arm is dynamically inclined an amount toward said leg;
- wherein the length of said segment determines said amount said brace arms are dynamically inclined as said brace arms reach said extended position;
- wherein said wheel rolls along a longer segment of said cam surfaces when said cams are closer to said medial/lateral joints;
- an adjustment wheel disposed between said contact surfaces of said cams;

said adjustment wheel comprising a central aperture and two cam surfaces, each surface contacting said contact surface on one of said cams and having an arcuate shape such that as said adjustment wheel is rotated in a first direction, said cams are equally pushed radially outward toward said medial/lateral joints and as said adjustment wheel is rotated in a second direction, said travel cams are equally allowed to move radially inward away from said medial/lateral joints.

13. The brace of claim 12 wherein said central joint is a geared polycentric joint.

14. The brace of claim 13 wherein said cams further comprise at least one slot axially aligned between said first and second ends of said cams and wherein pins seat in said slots to allow said distance between said cam surface and said medial/lateral joint to be adjusted.

15. The brace of claim 14 further comprising:  
a knob, located in a housing and adapted to rotate said adjustment wheel;  
an indicator on said knob adapted to line up with index markings on said housing;  
a circumference in said housing around said knob, said circumference containing regularly spaced detents;  
at least one resiliently deformable finger protruding from said knob and adapted to seat in any of said plurality of detents.

16. The brace of claim 12 further comprising a shell secured to each brace arm and extending partially around the leg.

17. The brace of claim 16 wherein said shells are integral with said brace arms.

18. The brace of claim 12 further comprising at least one pad secured to said brace adapted to contact said leg.

19. The brace of claim 12 further comprising, a spring spanning each medial/lateral joint biasing said brace arms to a non-inclined position.

20. The brace of claim 12 further comprising:

- wherein said central joint is a geared polycentric joint;
- at least one slot axially aligned between said first and second ends of said cams;
- pins seated in said at least one slot in said cams to allow said distance between said cam surface and said medial/lateral joint to be adjusted;
- a knob, located in a housing and adapted to rotate said adjustment wheel;
- an indicator on said knob adapted to line up with index markings on said housing;
- a circumference in said housing around said knob, said circumference containing regularly spaced detents;
- at least one resiliently deformable finger protruding from said knob and adapted to seat in any of said plurality of detents;
- a shell secured to each brace arm and extending partially around the leg;
- at least one pad secured to said brace and adapted to contact said leg;
- a spring spanning each medial/lateral joint biasing said brace arms to a non-inclined position.

21. A dynamic brace comprising:  
an upper and a lower brace arm;  
at least one strap securing said brace arms to a leg;  
a central joint pivotally connecting said brace arms such that said brace arms can pivot from a flexed to an extended position;  
a medial/lateral joint in each said brace arm proximate to said central joint;  
cam means for dynamically inclining said brace arms an amount toward said leg as said brace arms move to said extended position;  
adjustment means for adjusting said amount of inclination of each brace arms in said extended position;  
wherein said amount of inclination is equal for each said brace arm.

22. The brace of claim 21 wherein said cam means equally inclines said brace arms an amount toward said leg.

23. The brace of claim 21 wherein said adjustment means is adjusted to relieve pain associated with unicompartmental osteoarthritis.

24. The brace of claim 21 wherein said cam means comprises:  
two cams disposed between said medial/lateral joints, each said cam having first and second ends, an arcuate cam surface at said first end facing one of said medial/lateral joints, and a contact surface at said second end;  
a stop block proximate to the medial/lateral joint in each brace arm, opposite from said cam surface, and adapted to slide along a segment of said cam surface as said brace arms move to said extended position;

wherein as said stop block slides along said segment of said cam surface said brace arms are inclined an amount toward said leg.

25. The brace of claim 24 wherein said adjustment means increases said amount of inclination by adjusting said cams such that said stop block slides along a longer segment of said cam surface.

26. The dynamic brace of claim 24 wherein said cam means further comprises a wheel pivotally connected to each said stop block, wherein said stop block slides along said segment by said wheel rolling along said segment.

27. The brace of claim 26 wherein said adjustment means comprises an adjustment wheel disposed between said cams and carries out said adjustment by adjusting the distance between said cams and said medial/lateral joints.

28. The brace of claim 28 wherein said adjustment wheel comprises a central aperture and two cam surfaces, each surface adapted to contact one of said cams such that when said adjustment wheel is rotated, said cams are equally pushed radially outward away from said adjustment wheel or equally allowed to move radially inward toward said adjustment wheel.

29. The brace of claim 24 wherein said central joint comprises a geared polycentric joint.



30. A method of applying a dynamic bending force to a leg comprising:

locating a brace around a leg, said brace comprising an upper and a lower brace arm, a central joint positioned at a knee in said leg, said central joint pivotally connecting said brace arms such that said brace arms can pivot from a flexed to an extended position, a medial/lateral joint in each brace arm to allow said brace arm to incline toward the leg;

dynamically inclining said brace arms an amount toward said knee as said brace moves from said flexed to said extended position to apply a bending force across said knee;

adjusting said amount said brace arms are inclined in said extended position such that said bending force has a desired magnitude;

wherein said adjusting step comprises a single adjustment that equally affects said amount of inclination of each brace arm.

31. The method of claim 30 wherein no bending force is applied when said brace arms are in said flexed position.

32. The method of claim 30 wherein said brace comprises cams that perform the dynamically inclining step.

33. A brace adapted for use in the method of claim 30.

34. The method of claim 32 wherein said bending force is used to treat unicompartmental osteoarthritis.

35. The method of claim 34 wherein said desired magnitude is sufficient to completely open a damaged compartment of a knee.

36. The method of claim 32 wherein said brace further comprises a central adjustment wheel that it used to carry out the adjustment step.

37. The method of claim 32 wherein said brace comprises two cams and said adjustment wheel is located between said cams and carries out the adjustment step by adjusting the distance between said cams and said medial/lateral joints.

38. The method of claim 37 wherein said brace further comprises a stop block in each brace arm adapted to contact and slide along a segment of said cam, thereby dynamically inclining said brace arms an amount toward said leg.

39. A brace adapted for use in the method of claim 38.